

V-tech

Dynamometer

User manual

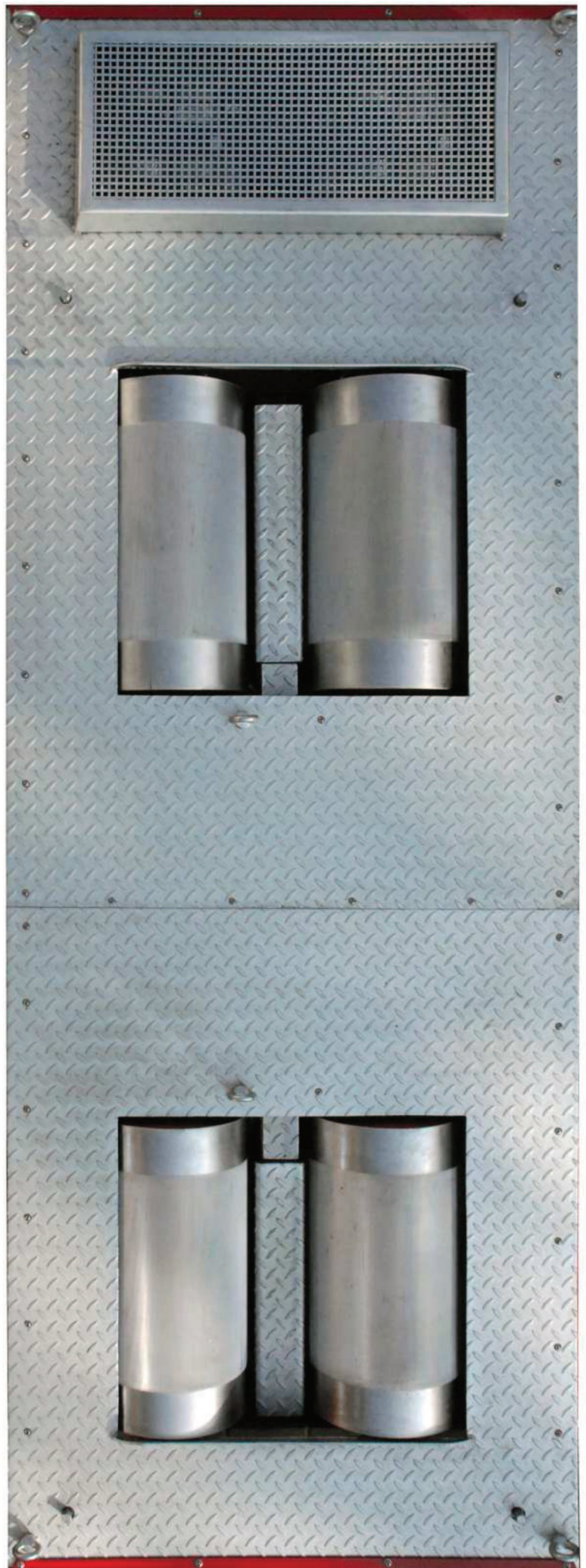


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The present Manual is considered as dyno accessory and it should be delivered along with the dyno in case of its sale.

The Manual contains information concerning all versions of V-tech dynos. Some of the data can refer to elements which are not present in the purchased version.

The information and technical data enclosed in the Manual were up to date in the moment of its publication. However, Power4Car s.c reserves the right to make later changes in the construction and in the technical specifications of the dyno without notifications and without any liabilities.

Your security, as well as the security of others, is very important. The handling of this dyno also implies an essential responsibility for the security.

Important notices related to the user security have been placed in this Manual, as well as in various places of the dyno. Every notice indicated potential staff health hazard.

Of course, it is not possible to foresee every possible dangers related to exploitation or to the service of the dyno. The staff should behave according to common sense.

Please get to know the following signs:



- Important information:



- Attention



- Special Attention



- Keep out of the machine during the measurements



- Stop



- Get to know

1. General Information

1.1 Dyno

1.1.1 The V-tech Dyno Types

The Power4Car enterprise manufactures seven dyno types:

- - **VT-2** – single axle inertial
- - **VT-2/B1** - single axle with a TELMA eddy current brake,
- - **VT-2/B2** - single axle with two TELMA eddy current brakes,
- - **VT-4** – double axle inertial
- - **VT-4/B2** – double axle with two TELMA eddy current brakes
- - **VT-4/B4** – double axle with four TELMA eddy current brakes
- - **VT-1** - for motorcycles, portable version

Brakes used in Vtech dynos are TELMA 350kW eddy current brakes.

One should note that on single axle or double axle dyno also motorcycles can be tested, more details in Motorcycle Fastening.



The VT-2(,,,) dyno is intended to test front wheels or rear wheels powered cars.



Attention! Testing A.W.D cars on the VT-2 is NOT RECOMMENDED. The Power4Car company is not liable for any damages of the dyno and/or car or any losses caused by inadequate use of the V-Tech dyno.

The VT-4, VT-4/B2, VT-4/B4 dyno – has been designed and constructed for both one- and two-axis powered cars.

It is sufficient to mark, before the beginning of the measurement, which drive type is used in the vehicle and the computer will automatically recalculate all the measurement data.

1.1.2 Dynos with eddy current brake.

The eddy current brakes from TELMA, mounted for the customer order, appear in one version: 350kW. They can be installed in VT-2 or VT-4 dyno.


Considering their capabilities, eddy current brakes are used, among others, for road simulations (e.g. air resistance simulations and/or slopes with a possibility to set the slope up to 45 deg.) and for engine tuning (possibility of constant rpm maintenance

thanks to the use of automatic regulators applying the load to the car, eg. during the tuning of LPG powered engines).


More in eddy current brakes point in further part of the Manual.

1.1.3 Maximum admissible load for the V-tech dynos

For the VT-2 and VT-4 dynos maximum admissible values are:

	<i>Speed</i>
	$V_{max} = 300 \text{ km/h}$
	<i>On axle load</i>
	$Kg_{Axis} = 3000 \text{ kg}$

1.1.4 Work safety during work with the V-tech dyno

	Attention! Information contained in this point is essential for health and life of the staff taking part in the measurements. One ought to carefully observe all after mentioned safety rules. Not complying to these rules can lead to health damage or even to death.
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- **Noise level**

Functioning of the dyno and the car can produce a noise of intensity up to 120 dB during the tests.

The staff should have individual equipment for ear protection (soundproof headset recommended)



- **Ventilator / combustion gases exhaust**

In view of high combustion gases emission and of the closed room, **THE USE OF COMBUSTION GASES EXHAUSTOR IS IMPERATIVE.**

Failing to comply with this requirement can result in serious poisoning by CO, CO₂, nitrates, fuel exhalations and others, that can lead to health damage or even to death.



- **Non-authorized persons**

Non-authorized persons are not allowed in the room where the dyno is installed during any tests.

Only the staff trained in the service of the dyno can be present in the room.



- **Hot objects – the engine**

During test measurements the car engine heats, as during usual drive, up to temperatures 90-100°C. The lack of normal cooling of the engine can result in block heating to temperatures higher than 100°C. The use of industrial high-power ventilators is required for the purpose of car cooling. At the opening of the motor hood one should especially mind hot objects.

DO NOT TOUCH HOT OBJECTS WITHOUT PROTECTION



- **Fire extinguisher**

It is required in the workshop.



Group	Fire type	Extinguishing means
A	solids, mainly of organic origin (paper, coal, wood, also plastics)	water, foam, CO ₂ extinguishing powder,
B	flammable liquids and matters that melt (fuel, oil, acetone, melting plastics)	Foam, dry powder, CO ₂
C	Gases (methane, propane)	Extinguishing powder, CO ₂
E	Group A, B, C, D fires close to electrical appliances	Extinguishing powder, CO ₂



- **Pit protection**

After the car fastening (for all the time of the measurement) and when the dyno is not used, the service pit must be protected with covers.

2. Basic information



2.1 Hardware key

The key protects the dyno software from copying and simultaneously acts as the software license. Before starting the dyno software the key must be inserted into an USB port.



2.2 Project

A project must be created for every tested vehicle. It will identify a given vehicle in the program; its data will be saved in the database.

A project is described by the following information:

- name
- registration number
- car brand
- car type
- engine type
- drive type
- other annotations



2.3 Measurement

This is a set of data describing the dyno testing, including sensor data. The user can change the following parameters:

- measurement name
- gear ratio [*]
- measurement type (power on engine or power on wheels)
- type of vehicle (according to standards) [*]
- top and bottom rpm cut-off
- show/hide drivetrain power losses
- standard to be used



2.4 Database

The database allows to store **projects** indexed by client data and to assign dyno measurements to projects.



2.5 Gear ratio

It is vehicle speed measured on the wheels by the dyno in the moment when the engine rotates with the speed 2000 rpm, measured on gear in which the measurement will be made – usually it is the top gear.

2.6 Banks

The program features special edition fields called banks, where the performed measurements are saved. Also the data from projects performed earlier is stored in banks. The data from banks are stored in computer memory. It can be saved to and loaded from the database. [*] The program gives access to four banks, where four independent measurements in one project can be saved or to each bank an element of another project can be written, with its own identifying data, by import from the database. If all the banks are occupied, the contents of one of them can be cleared by deleting an existing test (after saving it to the database), and in a clear bank next measurement can be made or another measurement [*] can be loaded from the database. Thanks to the option of loading to banks the tests for different vehicles from the database the results can be compared. Bank selection is realized by positioning the cursor in the edition field of a given bank, causing the text field colour change into yellow.

2.7 Graphs

Graphs show the measurements saved in individual banks. The data from the dyno test is also shown, along with sensor data vs. rpm during car acceleration.

2.8 Standard

Applying standard for individual measurement of torque and power allows to include corrections resulting from the values of pressure and temperature of the air at which the measurement is taken. The program can recalculate the values according to the following worldwide standards:

- DIN 70020
- EWG 80/1269
- ISO 1585
- JIS D1001
- SAE J1349

The values of ambient pressure and temperature are read from sensors localized on the external display. If the display is not connected during the test, the standard selection will be impossible.

3. Vehicle Fastening

3.1 Driving the car on the dyno rolls

The method recommended applies to both single axle and double axle dynos.

1. Check up the dyno.
2. Make sure whether the lifting beam [*] is in upper position.
For this purpose, check if the pneumatic valve is in the “open” position.
3. In the case of double axle dyno pre-set the position of the dyno mobile axle.
[*]

Remember: no one can be then in the range of mobile part move.

4. Drive the tested vehicle slowly on the dyno rolls. The wheels should be in the middle of roll base.

Before the beginning of vehicle centring remember to close the pneumatic valve and make sure that the lifting beam is in the bottom position.

In the case of double axle dyno before the centring operation the dyno mobile axle should be set in suitable position ensuring adequate adherence of the wheels to the rolls.. [*]

5. Protect the vehicle against falling out from the rolls during the test.

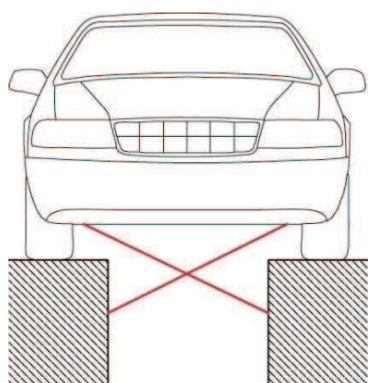
Remember that vehicle fastening can be performed only when the rolls are completely stopped and the engine is not running.

6. Connect the required measuring equipment and the exhaust-pipe taking the combustion gases from the car exhaust pipe to the exhauster.

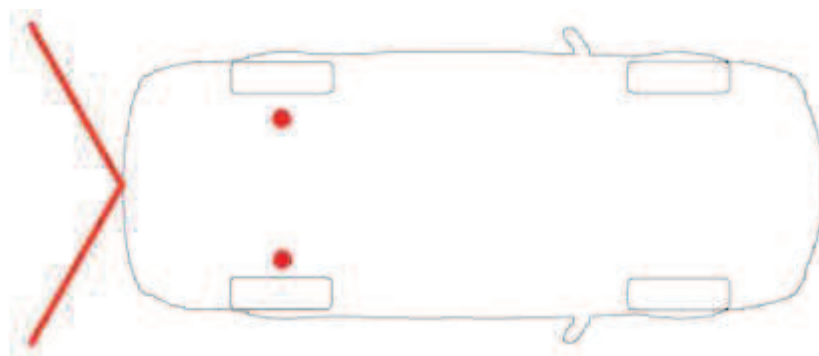
After leaving the pit cover it with protection boards.

7. Before starting the test, all persons should leave the dyno room, with exception of the staff taking part in the measurement.
8. Turn on external light sign informing about the test in progress and turn on the exhauster recon ducting the combustion gases out of the dyno room.

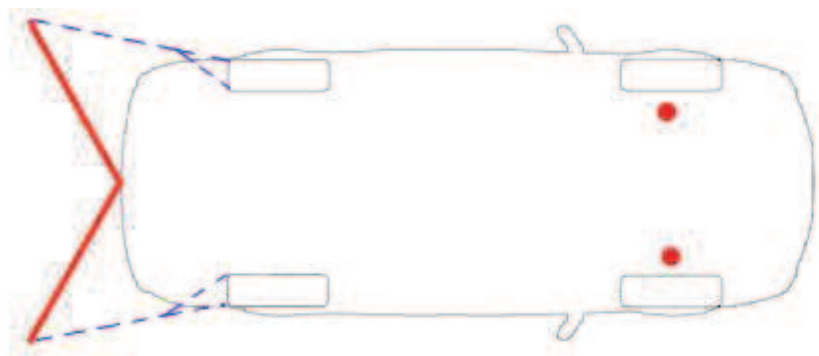
3.2 Fastening of one-axle powered car



Fastening method



Rear wheels driven vehicle



vehicle

Front wheels driven

Fixing points

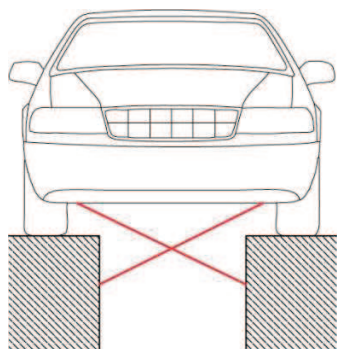
Red line and red points mark fixing points and the method of proper fastening of the car to the foundation by the means of anchor ties, belts and ratchet tighteners.
Dotted blue line – another possible method of vehicle fastening (anchoring).



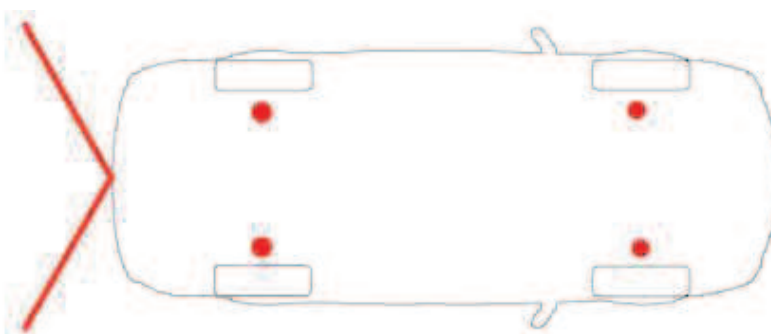
The belt cannot be damaged in any area. It should be tightened in order to prevent vehicle movement on rolls during the measurement.

Too strong belt tightening can lead to the increase of power loss during tests.

3.3 Fastening of two-axle driven car



Fastening method



Fixing points

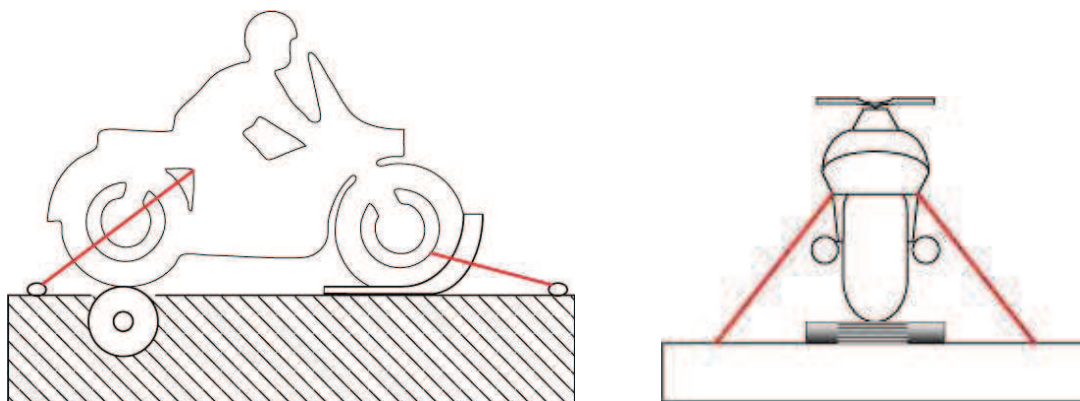
Red line and **red points** mark fixing points and the method of proper fastening of the car to the foundation by the means of anchor ties, belts and ratchet tighteners.
Dotted **blue line** – another possible method of vehicle fastening (anchoring).



The belt cannot be damaged in any area. It should be tightened in order to prevent vehicle movement on rolls during the measurement.
Too strong belt tightening can lead to the increase of resistance forces during tests.

3.4 Motorcycle fastening

3.4.1 Fastening to motorcycle dyno



Red line – recommended method of fastening the motorcycle to the dyno.



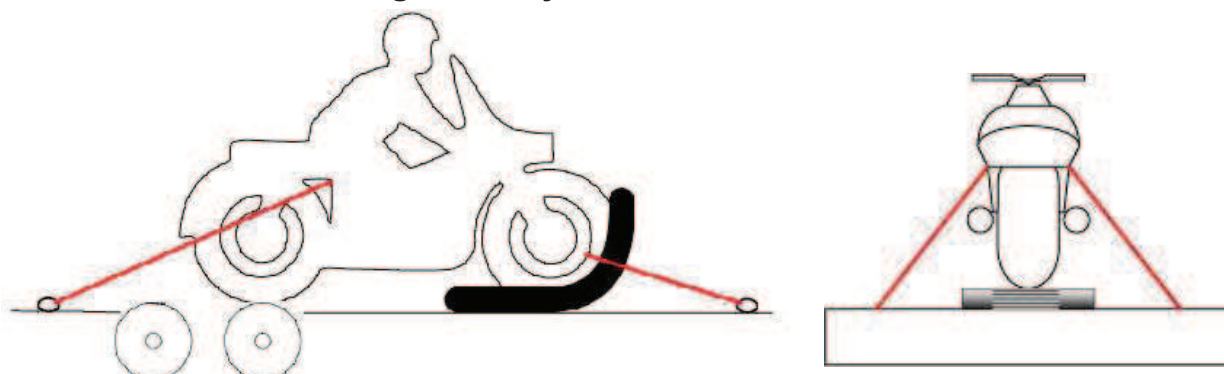
MAKE SURE THAT THE REAR FASTENING BELT DOES NOT TOUCH THE TYRE.

BELT ABRASION DURING THE MEASUREMENT CAN LEAD TO AN ACCIDENT!



The belt cannot be damaged in any area. It should be tightened in order to prevent motorcycle movement on roll during the measurement. Too strong belt tightening can lead to the increase of power loss during tests.

3.4.2 Fastening to car dyno



Red line – recommended method of fastening the motorcycle to the dyno.



The black arm is an element necessary to perform motorcycle tests on car dyno.



MAKE SURE THAT THE REAR FASTENING BELT DOES NOT TOUCH THE TYRE.

BELT ABRASION DURING THE MEASUREMENT CAN LEAD TO AN ACCIDENT!



The belt cannot be damaged in any area. It should be tightened in order to prevent motorcycle movement on roll during the measurement.
Too strong belt tightening can lead to the increase of power loss during tests.

4. Room ventilation and combustion gases exhaust

The room ventilation is essential for the health and the life of staff working on tests. It is important also for proper measurements. Too high temperature or varying values of temperature between subsequent tests can lead to differences in the behaviour of car control unit.

Certainly, one can choose adequate norms in the program to properly recalculate temperature and pressure values, nonetheless the room temperature should be maintained at the level about 25°C for all measurements.



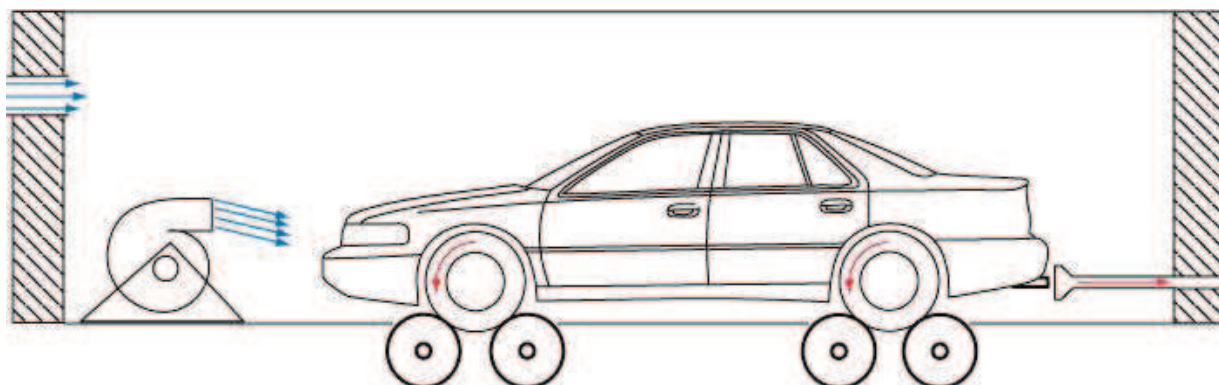
Combustion gases exhaust

In view of high combustion gases emission and of the closed room, THE USE OF COMBUSTION GASES EXHAUSTOR IS IMPERATIVE.

Failing to comply with this requirement can result in serious poisoning by CO, CO₂, nitrates, fuel exhalations and others, that can lead to health damage or even to death.



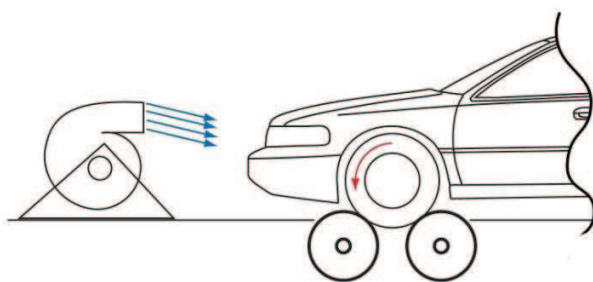
Room airing is recommended after every measurement on the dyno.



5. Vehicle cooling during dyno measurements

For the purpose of car engine cooling during the tests the use of industrial high-power ventilators is required (power at least 2,5 kW, air flow above 5000 m³/h. The lack of cooling in closed room can lead to incapacity of car cooling system and in consequence to engine damage,

Recommended ventilators:
WBD-400 5,5kW 9360m³/h



During car measurement, especially during forceful tests with the use of eddy current brake (e.g. road tests, constant RPMs) the temperature indicator should be monitored to prevent the engine overheating.

Cars during the measurements are very often accelerated on the dyno up to speeds over 200 km/h; unfortunately stream ventilators [*] produce only about 100 km/h air speed at the output.

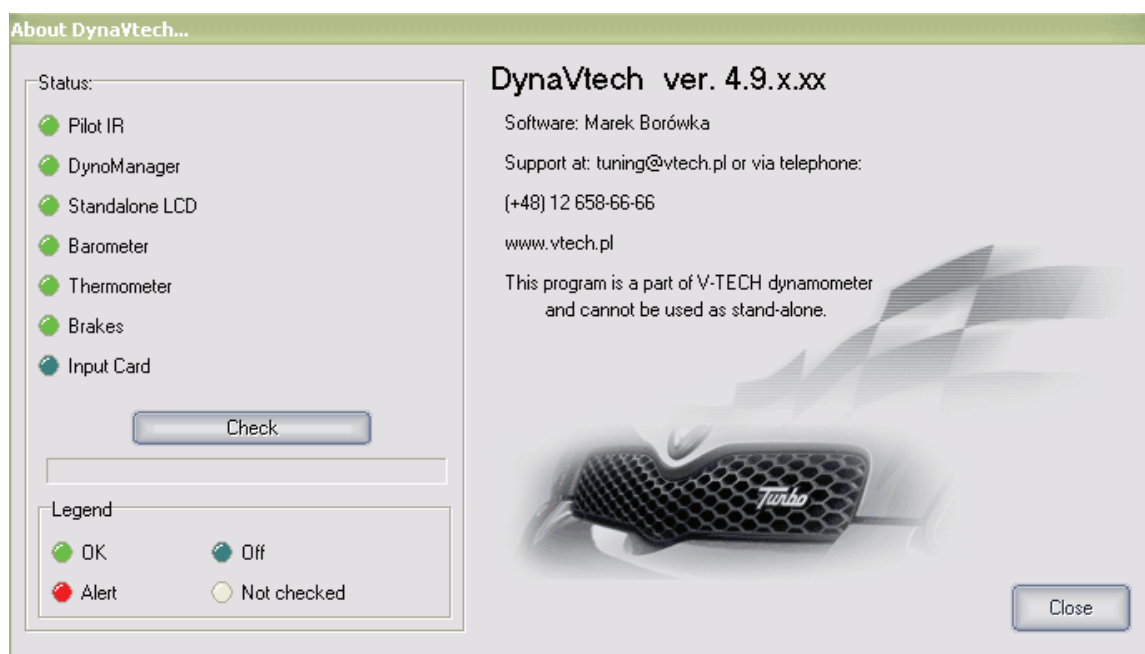
Even airflow of 4000 l/s (14400 m³/h) can be unable to assure cooling equivalent to normal drive cooling at speeds of 200 km/h.



6. DynaVtech Program Launching

6.1 Device status check-up

After launching the program an information is displayed showing software number and version along with the status of devices connected to the dyno.



The possible errors are:

barometer, thermometer and display:

- the display plug is not connected – check if the communication cable is connected to a serial port or USB port
- display power supply is off – check if the power cable is connected
- brake power supply is off – check if brake power is in “on” position
- the brake plug is not connected - check if the communication cable is connected to a serial port or USB port
- input card:
 - the card is not connected, fell out from the slot or driver error – pleas contact the V-tech technical department [*].



If all devices function properly, press the “close” button to pass to program main menu.



7. Preparation of the program for measurements

Show	Name	Shift	Power on:	Cut	Loss	Norm	Action	Client
#1	No project	93	engine	Cut	✓	no norm	S Clt ClP	Registration
#2	No project	93	engine	Cut	✓	no norm	S Clt ClP	Brand
#3	No project	93	engine	Cut	✓	no norm	S Clt ClP	Model
#4	No project	93	engine	Cut	✓	no norm	S Clt ClP	Drive
*	All	93	engine	Cut	✓	no norm	S Clt ClP	Engine
								Temperature



7.1 Create/select a project:

Creating a new project:

1. Press **Project...** button if the current bank is empty, the data that you will enter will apply to all empty banks (activated buttons in field "for banks" identify banks that are edited). If the current bank is not empty, all banks from the same project will be selected and the data will be automatically filled, allowing further edition.
2. In project field it is necessary to enter registration plate number; then the program checks if the vehicle have been placed earlier in the database; if so, the data will be filled automatically allowing further edition.
3. In the window that appears enter the client data. Confirm data by pressing the OK button.

Project

Project info

Registration KR 00000	Client John Doe
Drive Quattro	Brand Audi
Model A6 3.0 TDI 225 PS	Engine Typ <input type="radio"/> Diesel <input checked="" type="radio"/> Diesel Turbo <input type="radio"/> Gasoline <input type="radio"/> Gasoline Turbo
Comments Multitronic	


For banks: #1 #2 #3 #4

Cancel OK

When the data is entered and confirmed, a table with car description will be filled automatically in the main menu.

Client	John Doe
Registration	KR 00000
Brand	Audi
Model	A6 3.0 TDI 225 PS
Drive	4x4
Engine	Diesel Turbo
Temperature	

7.2 Project edition

The data in the table can be edited if the project is loaded to the active bank by pressing the button . If the bank is empty pressing the PROJECT button will open window for entering a new project.

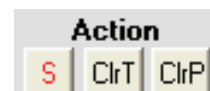


7.3 Removing a project from bank

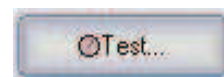
A project can be removed from the bank by pressing the ClrP button in appropriate bank.

The project data cannot be removed if the test has not been removed earlier from the bank by pressing ClrT.

- | | | |
|-------------|------------------------|--|
| S | - Save Test | - Save dyno test data to Data Base |
| ClrT | - Clear Test | - removes dyno test data from the bank |
| ClrP | - Clear Project | - removes project data from the bank |



After project creation the button serving to begin measurement will be active if the selected bank does not contain a test already.





8. Operations on banks, settings

8.1 Main menu, description

The main menu interface consists of a table of test banks, a client information panel, and two detailed views of the bank configuration.

Show	Name	Shift	Power on:	Cut	Loss	Norm	Action
#1	Stock	93	engine	Cut	✓	no norm	S ClrP ClrP
#2	Chip 1	93	engine	Cut	✓	no norm	S ClrP ClrP
#3	Chip 2	93	engine	Cut	✓	no norm	S ClrP ClrP
#4	Chip 3	93	engine	Cut	✓	no norm	S ClrP ClrP
*	All	93	engine	Cut	✓	no norm	S ClrP ClrP

Client information panel:

Client	John Doe
Registration	KR 00000
Brand	Audi
Model	A6 3.0 TDI 225 PS
Drive	4x4
Engine	Diesel Turbo
Temperature	

Buttons: Project... Test

Bank configuration details (left):

Show	Name
#1	No project
#2	No project
#3	No project
#4	No project
*	All

Bank configuration details (right):

Shift	Choose shift
93	20 21 22 23 24 25 26 27 28 29
93	30 31 32 33 34 35 36 37 38 39
93	40 41 42 43 44 45 46 47 48 49
93	50 51 52 53 54 55 56 57 58 59
93	60 61 62 63 64 65 66 67 68 69
93	70 71 72 73 74 75 76 77 78 79
93	80 81 82 83 84 85 86 87 88 89
93	90 91 92 93 94 95 96 97 98 99
93	100 101 102 103 104 105 106 107 108 109
93	110 111 112 113 114 115 116 117 118 119
93	120 121 122 123 124 125 126 127 128 129
93	130 131 132 133 134 135 136 137 138 139

Buttons: #1,#2,#3,#4

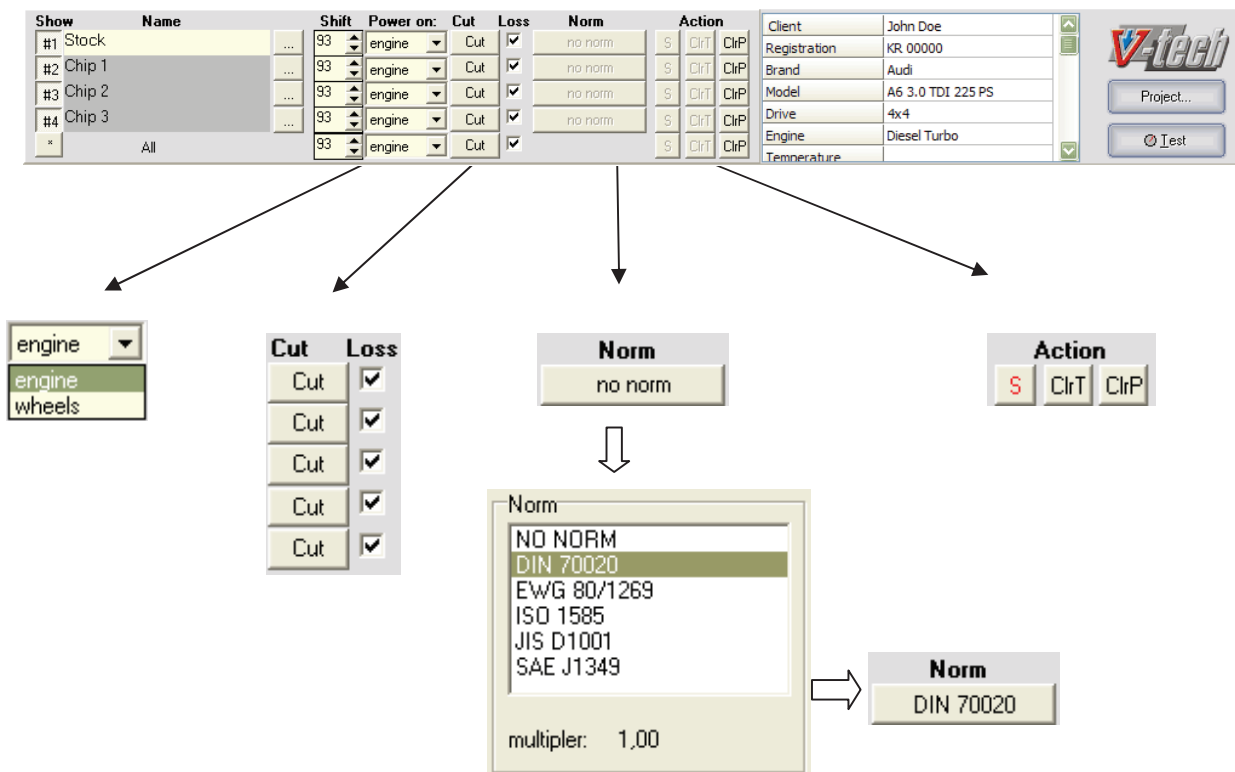
- toggle on activates drawing of the bank data, toggle off deactivates it.
The * button – applies to all the buttons described above.

Name

Edition field containing the name of the test. If the project is created, the name can be written. After finishing the test the name change is blocked and it is possible only by pressing the button opening a window allowing to change the name of already performed test.

Shift.

Determines the gear ratio in a given bank. Double click: quick change tables. More in: Gear ratio determination

**Power on:**

Allows the change of dyno test graph drawn. It is possible to show power if the engine or the power that is transferred to vehicle wheels.

Cut

Button that opens graph top and bottom RPMs cut-off window; usually the same cut-off is applied to all banks.

Losses

Hides/shows in the graph the losses of power transfer from the engine to the wheels, measured during dyno test.

Norm

The button activates standard selection; active only when the test has been finished and the ambient pressure and temperature display has been connected.

Action

- S** - **Save Test** – Save dyno test data to Data Base
- ClrT** - **Clear Test** – removes dyno test data from the bank
- ClrP** - **Clear Project** – removes project data from the bank



9. Gear Ratio Determination

9.1 Gear ratio determination by vehicle tachometer

Before first measurement of the car the proper shift ratio can be determined.

Choose the correct mode in "TEST" menu. Click on "shift calc" and choose the RPM value which will be your goal. Press Start button and accelerate the car on the test gear, up to your goal value. Stabilize the speed on the goal value. Press spacebar on dyno computer keyboard to synchronize the RPM between car and dynamometer. Stop the car.

When green light is on you can begin the measurement.



9.2 Gear ratio setting and correction

If a bank is selected, the gear ratio can be changed or corrected by up/down arrows.

There is also a possibility of gear ratio selection from the gear ratio table by double click in the field with gear ratio value.

Show	Name	Shift
#1	Stock	93
#2	Chip 1	93
#3	Chip 2	93
#4	Chip 3	93
*	All	93

The gear ratio correction can be executed also when there is data already loaded in the bank.

Show	Name	Shift	Choose shift																			
#1	Stock	93	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
#2	Chip 1	93	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
#3	Chip 2	93	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
#4	Chip 3	93	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
*	All	93	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
			120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139



The gear ratio depends on the gear which will be used during the test. It depends also on the wheels diameter (rim and tyre – especially when the tyres are changed from summer to winter ones and vice versa).

It is recommended to perform all measurements in the same gear and with the same configuration of tyres and rims, in order to maintain identical test conditions.

In the case of gear change and/or rims and tyres change the gear ratio should be measured again (see Gear ratio determination by vehicle tachometer)

10. Preparation and testing mode selection

10.1 Preparation for the test

1. Select a bank with loaded project but without a test. The test name can be changed before or after the measurement (default name will be Test1, Test2, etc..) Then the Test button becomes active – press it and go to the TEST menu.

Show	Name	
#1	Stock	...
#2		...
#3		...



10.2 Testing mode selection

After pressing “TEST” a menu will appear allowing to set the testing mode.

If the dyno has sensors, data registration is possible, by clicking connected sensors.

Depending on the dyno type, the measurements types are:

- inertial mode

For the dynos equipped with eddy current brake:

- inertial mode
- inertial mode with RPM stabilization
- braking mode

Test setup

Test settings:

- ☒ Inertial Test:
 - ☐ Stabilize RPMs before test at: 1750
 - ☐ Hold Brakes Percent: Hold value 30 %
 - Begin load increase at 40 km/h
 - Keep constant load from 50 km/h
- ☐ Stabilize RPMs before test:
 - ☒ Keep stabilization for: 2 seconds
 - ☐ Wait for IR Remote

Apply Norm: NO NORM

Apply cutting:
☒ Down ☐ Up
 RPMs: 1000 6500

Register:
☐ AFR ☐ Temp. A ☐ Temp. C ☐ Analog 1
☐ Pressure ☐ Temp. B ☐ Temp. D ☐ Analog 2

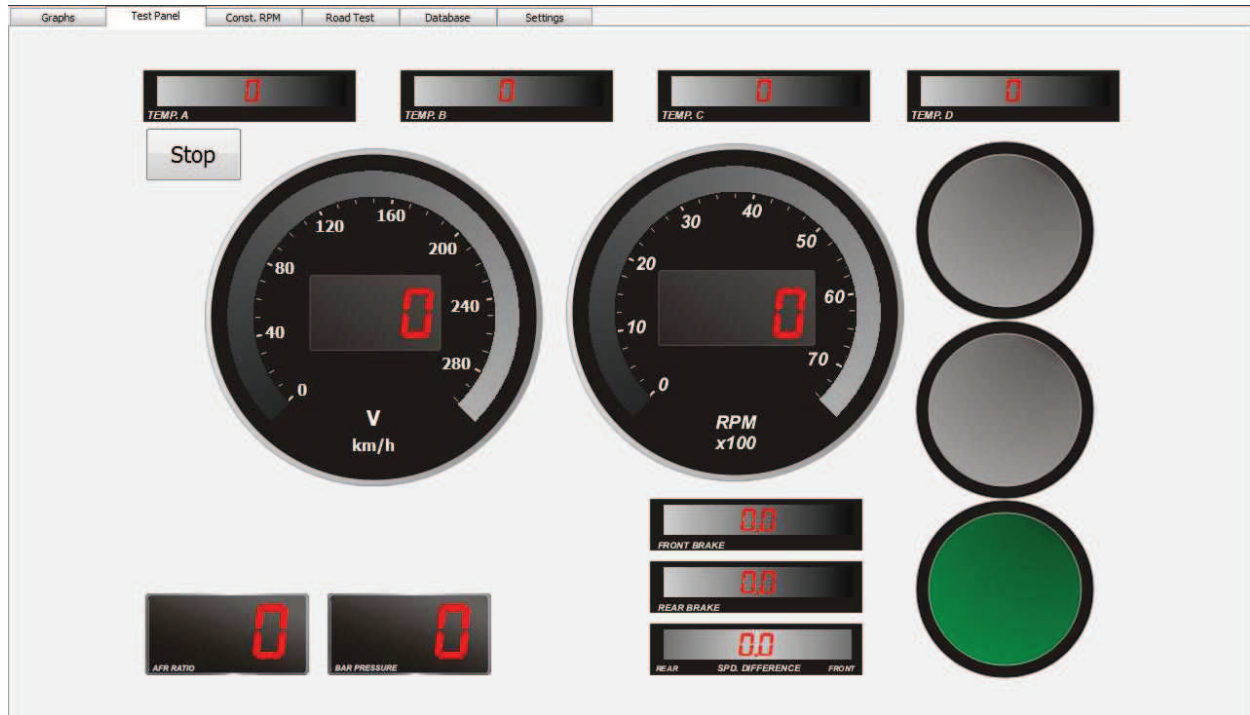
Shift Calc:
☐ Enable Shift Calc before test
 Goal: 1000

Warm Up:
☐ Enable Warm Up before test

Start

Before the measurement also Shift Calc or Warm Up can be chosen. Man can choose also Norm or Automatic Cutting of the test.

After selecting proper parameters press the Start button.
The tab of dyno test control panel will appear.



During the test the panel is showing information about:

- Temperatures from sensors
- Speed
- Engine RPMs (correct, if the gear ratio is set and the vehicle is in the proper gear)
- Lights signalling the dyno test state
 - Green** – Test can be started
 - Green**– Measurement in progress
 - Red** – Measurement finished
- AFR the air/fuel ratio in exhaust gases
- Pressure – e.g. connected to the boost pressure measurement
- The state of front and rear brake (in %)
- Speed difference between front and rear axle

Inertial dyno test



It is the simplest and fastest method for the measurement of the power of the car on the wheels and on the engine and for loss measurements. Of course, other modes also offer these possibilities.

Before starting the measurement, the tested car should be fastened with bolts to suitable handles (see Fastening of the vehicle)

To perform the measurement:

1. Select appropriate dyno test mode in the program and press START
2. Speed up the vehicle wheels, changing gears up at relatively low engine RPMs (max. 1000 rpm), up to the gear in which the measurement will be performed.
3. Press the acceleration pedal home, allowing the engine to reach maximum RPMs (gasoline engines usually up to approx. 6500-7000 RPMs, diesel engines 4500 RPMs). Press the clutch pedal releasing simultaneously the gas pedal; wait for self-stopping of the vehicle.



During the test one may not use the car brakes.
Often check the engine temperature, do not let it overheat.

4. When the vehicle speed is lower than 20km/h the test will finish automatically.
5. The measurement graph will be shown in the "Power and Torque Graph" tab.

After the stopping of wheels and rolls the engine should be turned off. Because of increased engine temperature, it is recommended to cool the engine by the means of blowing ventilator during a few minutes after finishing the test.

Room airing is recommended after every dyno measurement, if there is no blow-exhaust ventilation.

In the case of combustion gases smell, the room should be immediately aired and the persons present should leave it. If headaches, nausea, dizziness are reported, the doctor should be contacted immediately.

It is not recommended to perform few measurements in turn because of increased temperature of the engine and of the room.

Inertial mode with rpm suspension



This dyno test mode has been designed especially for the purpose of measuring cars with turbochargers. Holding the engine RPMs “down” improves spool-up and allows to built up correct boost by the turbocharger.

RPMs releasing is realised by the remote control or after the time defined earlier is elapsed.

Before starting the measurement, the tested car should be fastened with bolts to suitable handles (see Fastening of the vehicle)

To perform the measurement:

1. Select appropriate dyno test mode in the program and press START
2. Speed up the vehicle wheels, changing gears up at relatively low engine RPMs (max. 1000 rpm), up to the gear in with the measurement will be performed.
3. Press the acceleration pedal home, at first the computer will limit the RPMs as set in the program. After the time set earlier is elapsed, the brakes will be released, allowing the engine to reach maximum RPMs (gasoline engines usually up to approx. 6500-7000 RPMs, diesel engines 4500 RPMs). Press the clutch pedal releasing simultaneously the gas pedal; wait for self-stopping of the vehicle.



During the test the acceleration pedal should be kept full throttle position.

ONE MAY NOT use the car brakes.

Often check the engine temperature, do not let it overheat.

4. When the vehicle speed is lower than 20km/h the test will finish automatically.
5. The measurement graph will be shown in the “Power and Torque Graph” tab.

After the stopping of wheels and rolls the engine should be turned off. Because of increased engine temperature, it is recommended to cool the engine by the means of blowing ventilator during a few minutes after finishing the test.

Room airing is recommended after every dyno measurement, if there is no blow-exhaust ventilation.

In the case of combustion gases smell, the room should be immediately aired and the persons present should leave it. If headaches, nausea, dizziness are reported, the doctor should be contacted immediately.

It is not recommended to perform few measurements in turn because of increased temperature of the engine and of the room.

Braked mode



In this mode the dyno test runs as in the inertial mode, but the dyno will apply additional load using eddy current brake to not let the wheels accelerate faster than the set value.

This function is especially recommended for measuring very powerful engines, it allows to prolong the test. Without this option the measuring of high power engines would have been too short to let the turbocharger boost the engine in an appropriate way.

In this mode the measurement in low gears is possible.

Before starting the measurement, the tested car should be fastened with bolts to suitable handles (see Fastening of the vehicle)

To perform the measurement:

1. Select appropriate dyno test mode in the program. Setup the power of brake (in %) and speed value as a beginning of load. Then press START
2. Speed up the vehicle wheels, changing gears up at relatively low engine RPMs (max. 1000 rpm), up to the gear in which the measurement will be performed.
3. Press the acceleration pedal home, the computer controlling the brakes will restrain the engine to accelerate the vehicle with a set value of km/h/s . When the engine reaches its maximum RPMs (gasoline engines usually up to approx. 6500-7000 RPMs, diesel engines 4500 RPMs) press the clutch pedal releasing simultaneously the gas pedal; wait for self-stopping of the vehicle.



During the test the acceleration pedal should be kept full throttle position. ONE MAY NOT use the car brakes.
Often check the engine temperature, do not let it overheat

4. When the vehicle speed is lower than 20km/h the test will finish automatically.
5. The measurement graph will be shown in the "Power and Torque Graph" tab.

After the stopping of wheels and rolls the engine should be turned off. Because of increased engine temperature, it is recommended to cool the engine by the means of blowing ventilator during a few minutes after finishing the test.

Room airing is recommended after every dyno measurement, if there is no blow-exhaust ventilation.

In the case of combustion gases smell, the room should be immediately aired and the persons present should leave it. If headaches, nausea, dizziness are reported, the doctor should be contacted immediately.

It is not recommended to perform few measurements in turn because of increased temperature of the engine and of the room.

10.3 Constant rpm mode

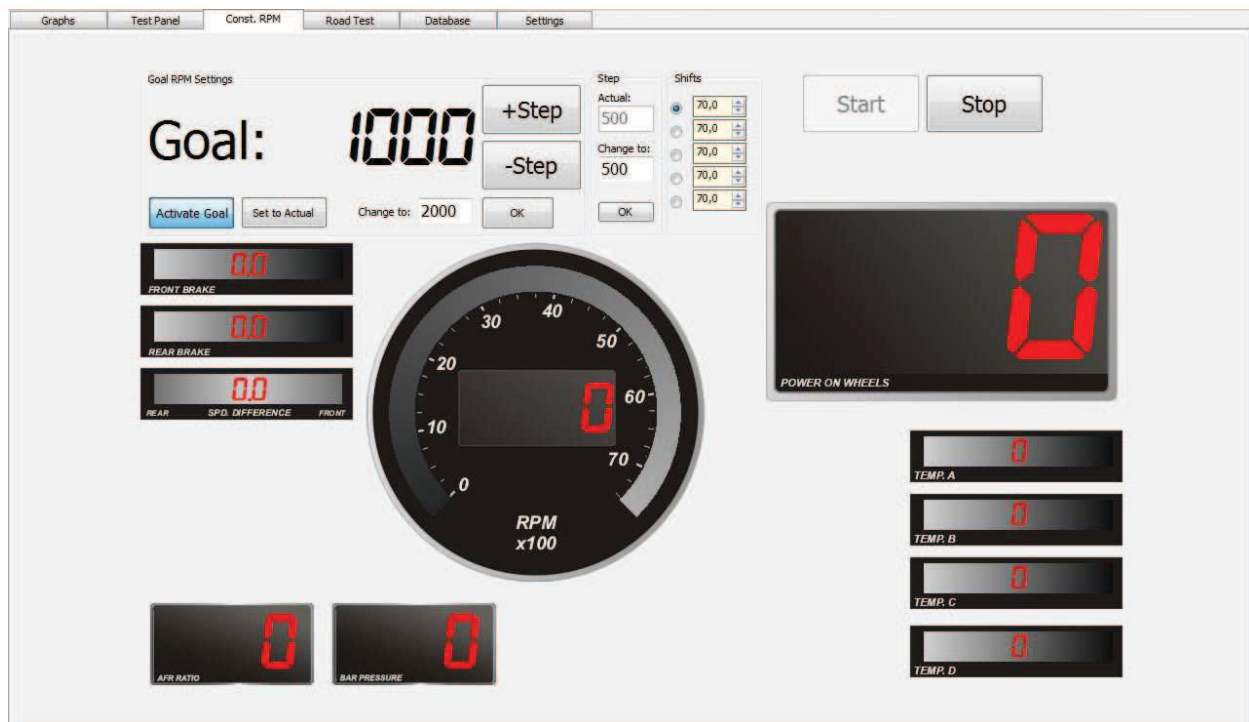


This function can be found in the upper tab (next to Test Panel tab) and it's usually applied in tuning of the LPG/CNG systems or building a base ignition and fuel maps in stand-alone engine control systems without overloading engine. It allows maintaining desired rpm rate by applying additional load with eddy current brakes. In the tuning panel current power on wheels is shown which allows on-line tuning of a LPG/CNG installation and obtaining the highest power possible.

Before starting the measurement, the tested car should be fastened with bolts to suitable handles (see [Fastening of the vehicle](#))

To perform the measurement:

1. Select appropriate dyno test mode in the program and press START



2. Speed up the vehicle wheels, changing gears up at relatively low engine RPMs (max. 1000 rpm), up to the gear in which the measurement will be performed.
3. Press the acceleration pedal home, the computer controlling the brakes will restrain the engine to maintain the rpm rate set earlier at completely pressed gas pedal.

During tuning it is possible to change rpm rate threshold on the computer, by the mouse.



ONE MAY NOT use the car brakes.
Often check the engine temperature, do not let it overheat.

After the stopping of wheels and rolls the engine should be turned off. Because of increased engine temperature, it is recommended to cool the engine by the means of blowing ventilator during a few minutes after finishing the test. Room airing is recommended after every dyno measurement, if there is no blow-exhaust ventilation.

In the case of combustion gases smell, the room should be immediately aired and the persons present should leave it. If headaches, nausea, dizziness are reported, the doctor should be contacted immediately.

It is not recommended to perform few measurements in turn because of increased temperature of the engine and of the room.

Buttons

CHANGE TO - enter the value of desired rpm step

+STEP – pressing the button will increase the rpm rate by the value shown

--STEP - pressing the button will decrease the rpm rate by the value shown

- quick change to a given rpm rate

10.4 Road test mode

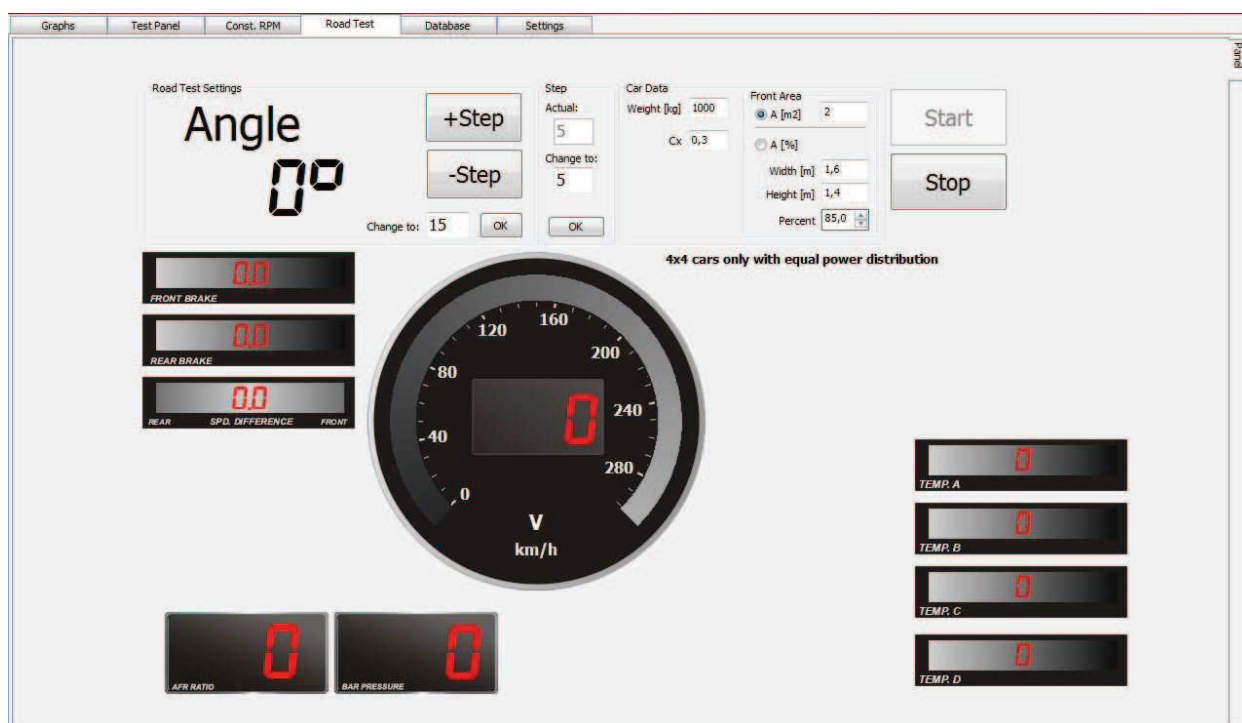


This mode simulates road condition. Basic data should be written to the software as weight, C_x value and front area in m^2 . During acceleration the brakes will apply the proper load on dyno rolls – this will enable to simulate air and traction resistances. This mode also give possibility to simulate hills.

Before starting the measurement, the tested car should be fastened with bolts to suitable handles (see Fastening of the vehicle)

To perform the measurement:

1. Select appropriate dyno test mode in the program and press START
2. Drive and change gears at the same way as on the road.



ONE MAY NOT use the car brakes.
Often check the engine temperature, do not let it overheat.

After the stopping of wheels and rolls the engine should be turned off. Because of increased engine temperature, it is recommended to cool the engine by the means of blowing ventilator during a few minutes after finishing the test.

Room airing is recommended after every dyno measurement, if there is no blow-exhaust ventilation.

In the case of combustion gases smell, the room should be immediately aired and the persons present should leave it. If headaches, nausea, dizziness are reported, the doctor should be contacted immediately.

It is not recommended to perform few measurements in turn because of increased temperature of the engine and of the room.

Buttons

+STEP - pressing the button will increase the slope by the value shown

-STEP - pressing the button will decrease the slope by the value shown

CHANGE TO – enter the theoretical slope value in degrees (quick change)

Type	from	to
Cabrio	0,5	0,7
Combi	0,5	0,7
Sedan	0,4	0,55
Coupe	0,3	0,4
Tracks	0,8	1,5
Bus	0,6	0,7
Motorbikes	0,6	0,7

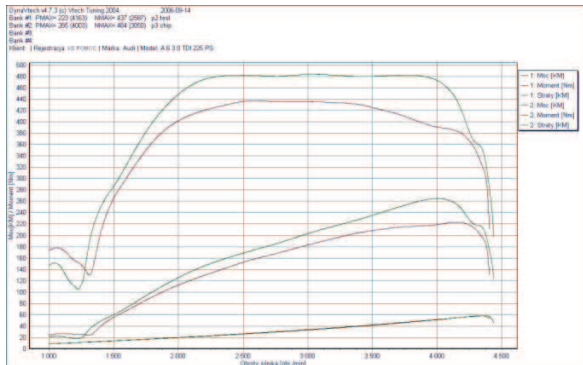
- Resistance percentage [%]
depends on the body type:
- sport cars approx. 85%
- passenger cars approx. 90-95%
- cargo cars approx. 93-98%

vehicle mass should be entered
 C_x – resistance coefficient

11. Measurement results analysis

11.1 Graph

The graph is very precise visualisation of the measurement results; the measurements from the active banks are plotted.



The V-Tech dyno and associated software offer very precise information about the performed test. The program gathers about 2500 samples in one second. As it is created basing on such a big data amount, the graph represents the tested engine performance very accurately.

11.1.1 Tracing

After selecting the “tracing” option a table and cursor tracing lines appear in the graph area. This enables to follow the values of power, torque, engine losses and sensor readings at individual rpm rate values in any area of the graph. The table shows values resulting from the cross of the vertical tracing line (here: magenta) with the drawn plots (green and blue).

	Power	Torque	Losses	Speed	
#1	170,0	329,0	23,2	96,5	X= 3623
#2	154,0	299,0	30,4	88,8	Y= 25,8
#3	n/a	n/a	n/a	n/a	Ysens= n/a
#4	n/a	n/a	n/a	n/a	
Compare	none				

11.1.2 Zoom

There is a possibility to enlarge a part of the graph. Press left mouse button in the graph area, mark the zoom box and release the button – the graph will be enlarged. To return to the full view of the graph press the “Autoscale” button or press left mouse button and holding it drag the cursor to the left.

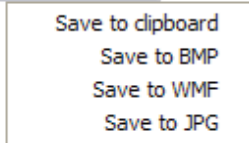
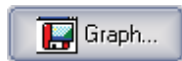
11.1.3 Cut off

If at the beginning or at the end of the test power and torque graphs there are artefacts of the gear changes at too high engine rpm rates or improper declutching, they should be removed using the “CUT” function. For this purpose press the **Cut** button in the main menu for appropriate bank and set the bottom and top cut off RPMs in the range of proper graph area. The changes in the graph occur in the moment of parameter changes on scrollbars.

Faster cut-off method is setting the scrollbar on the desired rpm value.

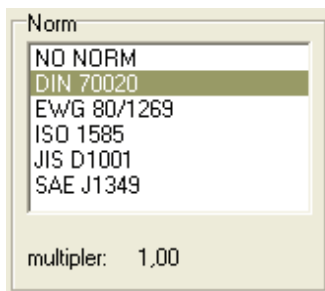
11.1.4 Graph export

Pressing the "Graph" button enables its export to:



- Clipboard
- BMP - bitmap image file
- WMF - vector image file
- JPG - image file

12. Norm



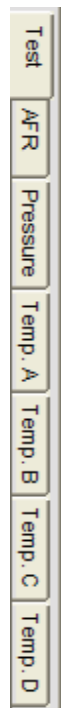
For each bank it is possible to choose standard provided that the display featuring barometer and thermometer has been connected to the computer during the test. The standard selection is realised by activating the "standard" button corresponding to appropriate bank and choosing the adequate standard. After the standard selection the following values are displayed: factor used relative to real measurement, test ambient temperature and pressure values.

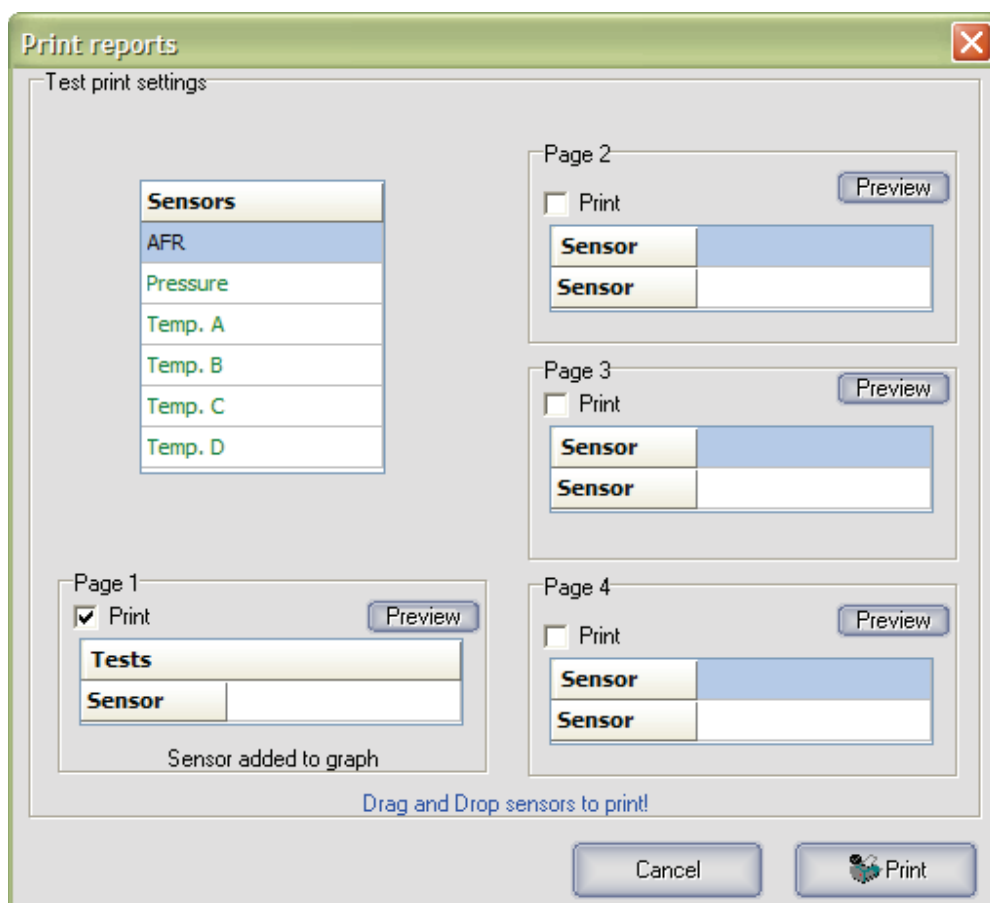
Most frequently used standard is DIN 70020.

13. Dyno test report

It is possible to choose, before the test, sensors to record readings from during the test. The corresponding graphs are available after the measurement by selecting the adequate tab, as it can be seen in the picture on the right.

Once the test is finished, in the "Graphs" tab the last measurement graph will be shown automatically along with earlier active measurements or the measurements read from the database.





In the first page the dyno test graphs are printed with their respective descriptions.

It is also possible to print the sensor reading graphs if they have been recorded during the dyno test. To print the sensor reading graph move the sensor name from the table of sensors available to a table on the selected page. In one page one or two sensor graphs can be printed.

The "Preview" button enables to see the graph before printing it.

The graphs from the active banks will appear in the print.

Page 1 – default: the last measurement graph Any sensor from the list above can be added to the printout.

The sensor selected for **Page 1** will be available also for other printouts.

Page 2,3,4 - for every printout any sensor set can be chosen; remember that the sensor selected before will not be available for other pages unless it was selected for **Page 1** printout.



14. Program configuration

#	Driver	Name	Turn On	Status	Value	Voltage	Config
1			<input type="checkbox"/>				Config
2			<input type="checkbox"/>				Config
3			<input type="checkbox"/>				Config
4			<input type="checkbox"/>				Config
5			<input type="checkbox"/>				Config
6			<input type="checkbox"/>				Config
7			<input type="checkbox"/>				Config
8			<input type="checkbox"/>				Config

Company
Address:

Logo:

Change...

Loadcells

Loadcell	Voltage	Tare
Front		
Rear		

Language
File name:
English
Apply

Units
Power:
Torque:
Speed:
Temperature:
Pressure:
Apply

Refresh

After selecting the Configuration tab the program parameters described above can be set.

14.1 Company data

In this tab it is possible to change firm address data which are visible in printouts. The data should contain only important details to fit easily in the printout.

14.2 Company logo

It is possible to add the firm logo as a background for graphs in printouts. The BMP format file should be selected. The logo should be bright and similar rather to a water-mark than to a drawing that could shield graph lines.

Company
Address:
V-tech Tuning
ul. Biezanowska 71
Kraków
tel. 012 6586666
www.vtech.pl

Logo:
C:\dyno_config\vttech.bmp
Change...

14.3 Language selection

To choose language, select it from the drop-down menu.

Language
Polish
English
Polish

14.4 Sensors configurations

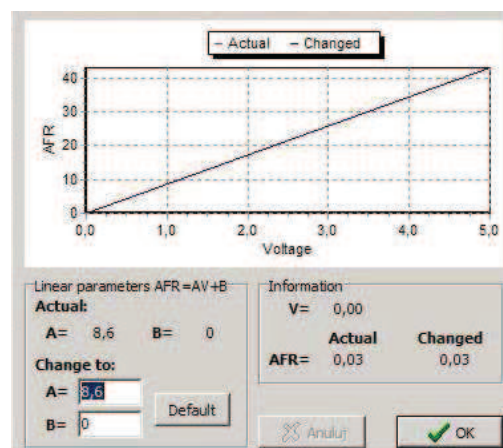
If the dyno has been equipped with devices for recording sensor data, it is possible to create graphs for:

- AFR sensor
- Intake manifold pressure sensor [*]
- Temperatures in the 0-300°C range
- Temperatures in the 0-1200°C range

The sensors support box main switch must be turned on, and in the case of AFR it power supply must be also on.

It is possible to install 6 sensors. In the example above installed AFR sensor and pressure sensor are shown.

For every verse [*] any sensor can be configured, by pressing "Configuration" and setting properly the parameters of a new sensor. Sensors with voltage output from -10V to +10V can be connected to the dyno. The drivers, in the form of DLL libraries, are included for every sensor ordered for the dyno. Please make changes according to the manual and recommendations for a given sensor. The changes in the table should be made according to recommendations.



14.5 Load cell

The table shows the load cell voltage in volts [V].

14.6 Units

The units can be changed by user in the Settings.



15. The Database

Graphs | Control Panel | Const RPMs | Road Test | Data Base | Config | Temp.: n/a [C] Press.: n/a [hPa]

Search Found: 65

Search: Everywhere

Directory:

Registration:

Mark:

Model:

Client:

Brand	Model	Registration	Client	Date	Directory
Audi	A6 3.0 TDI 225 PS	kr 00000	John Doe	2006-11-06	AUDI\A6 3.0 TDI 225 PS_KR00000_
Fiat	Punto 90			2006-07-11	FIAT\PUNTO 90_
HONDA	CIVIC COUPE			2006-03-28	Honda\CIVIC COUPE_
Honda	Accord			2006-02-09	AUDI\A6 3.0 TDI 225
Honda				2004-06-23	Honda_
Honda	1.6 T			2004-11-09	Honda\1.6 T_
Honda	ACCORD 2.0 T			2006-04-29	Honda\ACCORD 2.0 T_
Honda	Accord 2.0			2005-05-10	Honda\ACCORD 2.0 _
Honda	Accord 2.0i			2004-10-22	Honda\ACCORD 2.0i_
Honda	Accord 2.0i			2005-02-15	Honda\ACCORD 2.0i_
Honda	Accord 2.2 i-CTDI			2005-05-18	Honda\ACCORD 2.2 i-CTDI_
Honda	Accord 2.4i			2004-10-08	Honda\Accord 2.4i_
Honda	Accord CR			2004-10-22	Honda\ACCORD CR_
Honda	Accord CTDI			2006-06-13	Honda\Accord CTDI_
Honda	Accord i-CTDI			2005-08-09	Honda\ACCORD I-CTDI_
Honda	Accord IVTEC 2.4			2004-11-20	Honda\ACCORD IVTEC 2.4_

File	Changed	Power [KM]	Torque [Nm]	Tempera	Pressi
test_0.dv4	2005-05-10 08:40:42	157,6 (6538)	187,2 (4800)	none	none
test_1.dv4	2005-05-10 08:42:55	160,6 (6521)	189,5 (4852)	none	none
test_2.dv4	2005-05-10 11:03:11	158,3 (5233)	234,6 (3876)	none	none
test_3.dv4	2005-05-10 11:11:51	169,7 (6482)	200,6 (4808)	none	none

Project:

Test:

The searching option determines which projects will be displayed. Entering the requested text in the “Everywhere” field means that this text can be contained in the directory name, registration plate, vehicle brand or type and client name. Between formants below any selected searching modes can be written, connected by logical AND. The bottom table contains measurements in the selected project, the test saving date and information in which banks a given measurement was lately present. In the tab there are also buttons for customer data edition, test loading, and test removing from the database.



15.1.1 Measurement loading

Double-click the name of a measurement to load it to the currently selected bank.



15.1.2 Project loading

A project can be loaded to all banks without assigned project by double-clicking its row in the first table.

16. The V-tech chassis dyno warranty

Limited warranty of the V-Tech Tuning.

The V-Tech Tuning S.C. (further: V-Tech) warrants to the primary purchaser, being simultaneously an end user of the chassis dyno provided by the firm that it is free from material and manufacturing defects. With the conditions and restrictions described below, V-tech will assure repair or replacement of any element or subsystem of the product that will be reveal material or manufacturing defects. The elements repaired or replaced will be supplied by Vtech on exchange basis. They will be either new or renewed with the same functionality as new ones, If V-Tech will be unable to repair or replace a product, it will refund the sum equal the product value for the day of warranty claim registration.

The present limited warranty does not include any damages to the product resulting from improper installation (by non-authorised staff), accidents, abuse, misuse, natural causes, insufficient or excessive voltage, unnatural mechanical or environmental conditions or from deinstallation, repairs or modifications made by non-authorised persons. The present limited warranty does not apply also in the case of: products with the original identification data changed, damaged or removed; products that have been misused; products that have been resold as used or products that have been sold in discordance with Polish and/or EU export regulations.

The present limited warranty embraces only repair, replacement or cost refund of defectuous V-tech products. According to the above conditions, V-Tech is not liable for data loss costs or other costs related to determination of system failures or removing, maintenance or installing V-tech products. The present limited warranty does not apply to software supplied by a third party, the equipment installed and the data stored. In the case of complaint V-tech is obliged only to replace the device.

WARRANTY PERIOD

V-tech ensures 24-month warranty for the chassis dyno, i.e.:

- frame and all construction elements connected to it (casing, welds)
- rolls and elements connected to them, as shafts, bearings, clutch etc.
- hydraulical elements
- controlling computer, control box, control panel, sensors, display
- electrorotational brake(s)
- wiring
- DynaVtech software owned by V-tech The DynaVtech program has its own separate warranty, supplied at the purchase of the chassis dyno.
- the protection key for the DynaVtech software

The present limited warranty does not cover

- third parties software co-operating with the DynaVtech software and user-created functions, including plug-ins, modules, graph patterns, filtering expressions, view definitions

Vtech can break the warranty contract in case of occurrence of non-authorised installation and deinstallation and any modifications made by persons non-authorised by Vtech.

The present limited warranty belongs only to first purchaser, being simultaneously an end user, until the products is in his possession. The present limited warranty cannot be transferred upon third parties.

TECHNICAL SUPPORT

- Free technical support

- in case of any troubles in use of the product, contact the V-tech technical service department before the service notification.

- Paid technical repair if:

- warranty period (24 months) has been ended,

- the flaw resulted from improper using of the device
- the flaw has not resulted from material or manufacturing defects

In the case of non-justified calling of the Vtech technical team, the firm will claim the cost refund.

Vtech assures its customers free technical support in Poland, in Polish and English languages.

DECLARATIONS

The above warranty is the complete warranty for the V-tech chassis dyno, replacing all other warranties and declarations, oral or written, with the exception of the warranty resulting from the above statement. Vtech is not liable for all warranties non-defined in this range admissible by adequate legal regulations.

Total responsibility of Vtech resulting from the present contract or any other warranty, express or presumable, limits to repair, replacement or cost refund of the product. Repair, replacement and cost refund are the only and exclusive means applied. In widest range admissible by adequate regulations Vtech is not liable against purchaser or end-user of the Vtech product for any losses, damages, data losses, profit losses, income losses or any other losses accidental or resultant caused by purchasing, using, inability to use of the V-tech product even in Vtech has been informed about a possibility of occurrence of such losses.